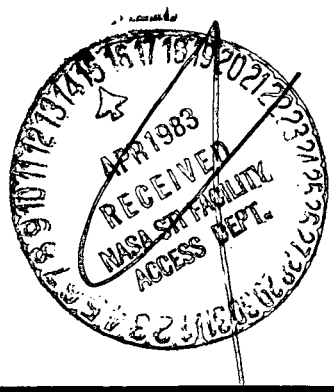
COSMIC

ANNUAL REPORT

1982



Computer Software Management and Information Center

Computing and Information Services • 112 Barrow Hall • The University of Georgia • Athens, Georgia 30602

THE UNIVERSITY OF GEORGIA OFFICE OF COMPUTING
AND INFORMATION SERVICES

January, 1983

This annual report reviews the activities of the Computer Software Management and Information Center (COSMIC) for the period January 1, 1982 through December 31, 1982. NASA contract NASW-3247 governs the operations of COSMIC by the University of Georgia's Office of Computing and Information Services.

Your attention is directed to the dissemination section of the report. In 1982 program number ARC-11446 "Hidden Line Code: sold 198 copies of the program. This outstanding sales record boosted our figures to all time highs.

In 1982, the University of Georgia's Marketing 960 class used COSMIC for the class study. This resulted in six marketing plans developed by students that serve as the basis for an overall COSMIC marketing plan. In addition, two noteworthy changes occurred at COSMIC. First, the NASTRAN® maintenance support subcontract was awarded to Sperry Systems Management in Huntsville, Alabama and second, John Gibson was named Director of COSMIC replacing Robert Brugh who resigned in order to enter into private industry.

Detailed information of these and other activities carried out by COSMIC during 1982, our sixteenth year of operation, is included in the various sections of this report.

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FOREWORD

This annual report describes the work performed from January 1, 1982, through December 31, 1982, under contract NASW-3247* in continuing the operation of the Computer Software Management and Information Center (COSMIC) by the University of Georgia. COSMIC serves as a collection, evaluation, an distribution center for computer software developed under the auspices of NASA and certain other federal agencies. The period of performance reported on herein represents the sixteenth year of operation of COSMIC by the University of Georgia.

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INTRODUCTION

The Computer Software Management and Information Center (COSMIC) is a computer software clearinghouse and distribution center operated by the Office of Computing and Information Services of the University of Georgia, under contract to the National Aeronautics and Space Administration (NASA). This center is supported by the NASA Technology Utilization program as part of its mission to make available to the public the results of technology deriving from NASA sponsored research and development efforts. Computer programs developed by NASA installations and NASA contractors are deposited within COSMIC. The programs are then disseminated not only to other NASA installations, but also to business, industry, educational institutions, and other government agencies. Through an inter-agency agreement between NASA and the Department of Defense, software developed by certain DOD agencies and their contractors is also deposited within COSMIC for dissemination in the same manner as the NASA technology.

This report covers the activities of the COSMIC center for the period January 1, 1982, through December 31, 1982, under contract NASW-3247, which was the sixteenth year that the COSMIC facility has been operated by the University of Georgia. The report is divided into seven sections, paralleling in certain respects the center's function. The first section presents a summary description of the major operational areas of the center with emphasis given to those activities notable during the period of performance of contract NASW-3247. Quantitative data on the software submittals, program verification, and evaluation are presented in the second section. The

dissemination activities are summarized in the next section. The fourth section describes customer services and marketing activities of the center for the contract year. The fifth section describes those activities devoted to the maintenance and support of selected programs. The sixth section reports on the performance of three special tasks under the contract: one being the development of a Customer Information system; the second, continuation of the COSMIC Abstract Recording System Project; and the third being the COSMIC Microfiche Project. The final section presents a brief summary of operational cost data.

1

OPERATIONAL SUMMARY

OPERATIONAL SUMMARY

Traditionally the operation of COSMIC has been described in terms of seven major functional areas whose characteristic activities have evolved naturally from the experience of more than a decade of continued operation of the center by the University of Georgia. Although the functional areas are closely interrelated, with staff members often contributing to several, these areas were separately designated as Administration, Dissemination, Customer Service and Marketing, Program Checkout, Evaluation, Inventory Control, and Special Developmental Tasks. In this operational summary, the characteristic process involved in each of these functional areas is briefly summarized. In addition, beginning with NASW-3247, a new functional area has evolved as part of the the COSMIC operation. This new area is the maintenance of selected computer programs and it is also discussed. The functions of these operational areas are described in detail in the COSMIC Operations Manual. This manual was reviewed, updated and re-issued in 1982.

The area of Administration includes the normal management and supervisory activities for COSMIC. These activities include coordinating the software dissemination operations, providing technical direction, and assuring technical performance on contracts. Responsibility for this area rests primarily with the directorship and project managers. During 1982, John Gibson was named the Director of COSMIC replacing Robert Brugh who left for private industry.

The Dissemination function involves the tasks of order filling for both programs and documents and the maintenance of customer sales and lease

records. Quantitative data on dissemination activities for 1982 is given in Section Three of this report. In summary, however, 613 Non-Leased programs were distributed, including 104 distributions to NASA centers. A total of 2,162 documents (excluding catalogs) were distributed during the contract period, 267 of which were supplied to NASA facilities.

Software distributions through leases increased during the contract period with a total of 117 leases or lease renewals executed. This figure does not include the 41 lease program products distributed to NASA. A total of 45 program products were made available through lease agreements in 1982.

A new dissemination activity initiated during 1976 and continued during 1982 was the direct transmittal of program code and documentation to designated recipients at the request of Technology Utilization Officers. These packages are not subjected to technical screening and are transmitted for a fixed handling charge. These transmittals are termed 'AS IS TRANSFERS' and typically involve programs which would normally fail to meet COSMIC submittal standards but which were transmitted to requestors via COSMIC in order to make utilization of the COSMIC distribution facilities more routine by NASA personnel. A total of seven such transfers occurred during the contract period, four of which went to NASA centers.

The area of Customer Service and Marketing involves the dual tasks of providing for communication between customers and the center, and of promoting COSMIC and the services provided. The majority of the inquiries received by COSMIC involve requests for searches to identify programs potentially applicable to a user's stipulated needs. The total number of such searches logged by the COSMIC staff during 1982 was 5,827 domestic and 408

international. In addition, 43 problems concerning distributed programs were reported and handled.

The promotional activities carried out by COSMIC are described in detail in the Marketing section of this report. In brief, these efforts involved the continued solicitation of gratis advertisement of computer programs available from COSMIC in various technical press and trade journals; an increased attendance at trade shows and professional society meetings to promote the services and software available from COSMIC; the use of various media for the general promotion of COSMIC; the use of benefits analysis to highlight COSMIC's end results and to assist in marketing decisions; and the preparation of abstract collections and program summaries. The 1982 highlight was the participation of COSMIC in the University's Marketing 960 course. The result was six student prepared marketing plans which will serve as the basis of the COSMIC marketing effort projected for the next five years.

The Program Verification function, or the machine processing phase of the technical screening service provided by COSMIC, involves the compilation and/or assembly of submitted program code followed by linkage and/or loading in order to ascertain if the program code is syntactically correct and complete with respect to referenced subprograms as well as confirming the integrity of the recording medium on which the programs are supplied. During this year, the total number of programs processed in this way was 143. Although batch processing techniques are still commonly used in processing submitted programs, especially large systems, extensive use of interactive time-sharing facilities is employed in some program verification.

The Evaluation function involves the review of programs and supporting documentation following the machine processing phase to determine their

suitability for public release relative to the standards of completeness and content specified in the COSMIC Submittal Guidelines. For accepted packages, Abstracts and new Technology Briefs are prepared in this phase of the operation in addition to the assignment of category codes and index terms. Prices for distributed materials are also established during package evaluation. Factors considered in establishing the price charged for the program code include program source instruction counts as a gross measure of development effort, machine independence or vintage, the quality of the supporting documentation, the known or assumed sales potential for the package, the functionality of the program relative to comparably classified packages, and the demonstrated level of developer programming support. Program classification and publication activity during this contract year included the evaluation and re-evaluation of 220 packages, the preparation of 87 Tech Briefs, and the preparation of 95 program abstracts.

Inventory Control activities involve primarily the maintenance of receipt and processing records on all submitted programs and documentation, utilizing the computer based COSMIC Library Management and Reporting System. This is done to determine the status and location of submitted materials and to provide the regular management and service reports necessary for the operation of the COSMIC center. Continued emphasis has again been given this year to reviewing the accuracy and completeness of the data recorded on the master files for this system with the introduction of additional data entry editing and quality control specifications.

Special Projects in the operation of COSMIC are normally those projects begun under a particular contract at the request of the contracting agency. The duration of such projects is typically limited to a particular contract

period, but the results often have a continuing influence on the center, generally in terms of increased efficiency or ease of operation. During 1982, the COSMIC staff was involved with three special projects. The first was the continued maintenance of the COSMIC Abstract Recording System (CARS) Project; the second was the continuation of the Microfiche Project; and the third was the Customer Information Project. The result of the CARS project has been the creation of a machine-readable data base containing copies of COSMIC program abstracts, the development of support software to maintain the data base, and the development of an on-line searchable abstract data base. The result of the Microfiche Project has been the recording of program documentation on microfiche. This is an on-going activity due to the continuing submittal of new programs into the COSMIC inventory. The result of the Customer Information project was the initial analysis and design of a comprehensive system to maintain and process data related to COSMIC operations. A detailed discussion of each of these projects is reported in the section on Special Projects.

COSMIC began maintaining and providing support for the NASTRAN® structural analysis computer program in May, 1979. A subcontract was awarded to the Computer Sciences Corporation in November, 1979, to provide support for the maintenance of the NASTRAN® system. During 1982, the maintenance contractor was changed from CSC to Sperry. The solution of Software Problem Reports (SPR's) continued and a number of enhancements were added to NASTRAN® for the April 83 release. A total of 168 SPR's were corrected for the April 82 release by CSC, an additional 53 SPR's were corrected by Sperry for the April 83 release.

2

SOFTWARE SUBMITTAL PROCESSING

SOFTWARE SUBMITTAL PROCESSING

One hundred and seventy-two (172) programs and/or documents were submitted to COSMIC during the 1982 period compared to two hundred and thirty-three (233) submitted during 1981. Of the 172 logged receipts, 86 (50%) represent initial packages (both program and documentation), 7 (4%) were initial document submittals for which no corresponding programs were received, 13 (8%) were additional packages (both program and documentation), 21 (12%) were update packages (both program and documentation), 23 (13%) were additional documentation for previously submitted packages, 2 (1%) were documentation updates for previously submitted packages, 15 (9%) were subroutines or code corrections requested to complete previously submitted packages, and 5 (3%) represent source code updates or new releases of previously submitted packages. The distribution of these submittals from NASA and DOD sources is shown in Table I.

TABLE I

1982 NASA AND DOD SUBMITTALS

Submittal Type Received	NASA	DOD	Total
Initial Packages (Program and Document)	86	0	86
Initial Program (No Document)	0	0	0
Initial Documents (No Program)	7	0	7
Additional Packages	13	0	13
Update Packages	21	0	21
Additional Documentation	23	0	23
Documentation Updates	2	0	2
Additional Program Materials	15	0	15
Program Updates	5	0	5
	172	0	172

Table II illustrates the number of submittals COSMIC received from each center during 1982. The largest number of submittals, 35 (20%), was received from the Lewis Research Center (LEW). The Langley Reseach Center (LAR) was the second largest source of submittals, 33 (19%), followed by the Johnson Space Center (MSC) with 24 (14%), the Marshall Space Flight Center (MFS) with 21 (12%), and the Goddard Space Flight Center (GSC) with 20 (12%). Table III illustrates the total number of individual new technology reportable items received from each center since the beginning of COSMIC. Note that Table II reflects the total number of submittals in 1982 and Table III reflects the number of new technology reportable items submitted to COSMIC since the beginning of COSMIC. George C. Marshall Space Flight Center leads all centers with a total of 1,331 (31%) followed by the Lyndon B. Johnson Space Center with 1,022 (24%). Figure 1 shows the total number of submittals received each year since the beginning of COSMIC.

TABLE II

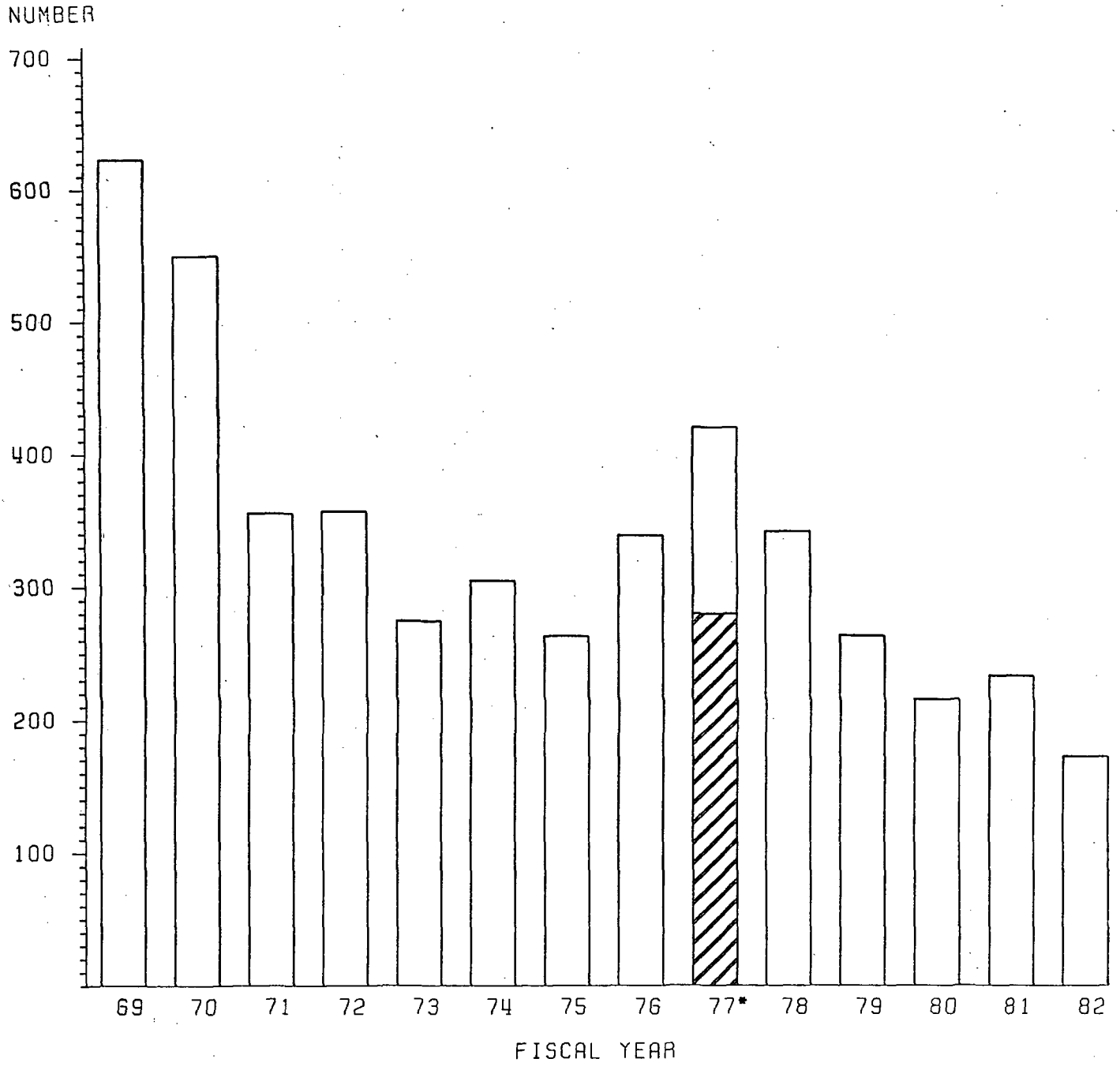
COSMIC 1982 SUBMITTAL ITEMS BY CENTER

Center	No. Submittals
Ames Research Center (ARC)	12
COSMIC (COS)	1
Department of Defense (DOD)	0
Earth Resources Laboratory (ERL)	4
Goddard Space Flight Center (GSC)	20
NASA Headquarters (HQN)	8
John F. Kennedy Space Center (KSC)	4
Langley Research Center (LAR)	33
Lewis Research Center (LEW)	35
George C. Marshall Space Flight Center (MFS)	21
Lyndon B. Johnson Space Center (MSC)	24
Jet Propulsion Laboratory, Pasadena (NPO)	10
	172

TABLE III

CUMULATIVE NEW TECHNOLOGY SUBMITTALS BY CENTER

Center	No. of Submittals
Ames Research Center (ARC)	82
COSMIC (COS)	83
Department of Defense (DOD)	82
Electronics Research (ERC)	13
Earth Resources Laboratory (ERL)	14
Flight Research Center (FRC)	15
Goddard Space Flight Center (GSC)	347
NASA Headquarters (HQN)	97
John F. Kennedy Space Center (KSC)	109
Langley Research Center (LAR)	317
Lewis Research Center (LEW)	301
George C. Marshall Space Flight Center (MFS)	1,331
Lyndon B. Johnson Space Center (MSC)	1,022
Jet Propulsion Laboratory, Pasadena (NPO)	385
Westinghouse Astronuclear Laboratory (NUC)	75
Wallops Station, Virginia (WLP)	11
	4,284



*EIGHTEEN-MONTH REPORTING PERIOD, JULY 1, 1976, THROUGH DECEMBER 31, 1977.
SHADED AREA REPRESENTS COMPARABLE TWELVE-MONTH DATA.

FIGURE 1

TOTAL NUMBER OF SUBMITTALS BY FISCAL YEAR

One hundred and forty-three (143) programs were processed by the programming staff during 1982. These figures include processing of new submittals, processing of programs from previous years requiring checkout prior to dissemination, and processing of updates, corrections, or additions to packages previously processed and found to be incomplete or erroneous. Program checkout can require from several days to several weeks, depending upon the size and complexity of the package.

Evaluation and classification during 1982 resulted in the distribution shown in Table IV (based on the IR classification dates). The number of program packages evaluated does not necessarily equal the number of program packages subjected to machine processing for a number of reasons: (1) documentation-only packages can be evaluated without machine processing; (2) packages may be reclassified when additional (requested) documentation is received without requiring additional processing of the program; (3) packages may be reclassified due to policy changes on screening criteria without requiring checkout; and (4) programs which were checked out under previous contracts may be machine verified again but not re-evaluated to ensure correctness and completeness when new orders are placed. The counts also reflect all classification transactions for a given package during the year; that is, a program designated Class 4 due to a request for additional information may later be reclassified 1 or 2 (and counted) when the information is received.

Those packages assigned a Class 1 status are programs developed under NASA sponsorship that not only meet the COSMIC submittal requirements for completeness and operational status but have been evaluated as innovative and

TABLE IV

1982 PACKAGE CLASSIFICATIONS BY SUBMITTAL SITE

Center Mnemonic	Class 1	Class 2	Class 3	Class 4
ARC	10	0	0	2
COS	0	0	0	1
DOD	0	1	0	1
ERL	2	0	0	0
FRC	0	0	0	0
GSC	21	3	2	4
HQN	4	3	0	0
KSC	1	1	1	2
LAR	30	2	3	8
LEW	21	0	6	15
MFS	7	1	9	12
MSC	15	0	6	8
NPO	9	0	4	5
WLP	0	0	0	0
	120	11	31	58

of exceptional quality. New Technology Briefs are prepared for publication in the NASA report series. During 1982, there were 120 packages of Tech Brief status processed, with the majority being packages submitted from the Langley Research Center, the Lewis Research Center, and the Goddard Space Flight Center. Because some of these packages represent update submittals for which Tech Briefs had previously been prepared and different machine versions of the same programs, the number of Tech Briefs actually written in 1982 was 87.

Class 2 packages, of which 11 were evaluated during 1982, are packages which meet the COSMIC submittal requirements for completeness and operational status but represent technology that is not of Tech Brief caliber. Abstracts are prepared for all newly submitted and for updated Class 1 and 2 packages for publication in the COSMIC Software Catalog. During 1982, 95 abstracts were prepared for publication. Abstracts are prepared for all Class 1 and 2 packages which are initial receipts or significant updates, therefore, a correlation between the Tech Briefs written and abstracts written cannot be made. The largest number of accepted packages (Class 1 and 2) for 1982 came from the Langley Research Center (LAR), the Goddard Space Flight Center (GSC), and the Lewis Research Center (LEW). Table IV indicates, by submittal center, the number of packages evaluated during 1982.

Although the number of published items has no direct relationship to the number of submitted items during any year because of the publication of previously incomplete items, a measure of the acceptance rate for packages received in any period can be obtained as the quotient of the number of packages with an initial status of 1 or 2 which were originally received during that period divided by the total number of packages which were initially received and evaluated during the same period. Applying this

measure to the packages received during 1982, an acceptance quotient of 67% results compared to a value of 46% for the previous reporting period.

Class 4 packages are those, which for one reason or another, were found to be incomplete or required additional information. They are assigned Class 4 status pending receipt of the required information. Items normally remain in Class 4 status up to twelve months, at which time they are reclassified as Class 3 (inoperative and/or unpublishable) unless the required information has been received for Class 1 or Class 2 disposition. During this year, 30 programs were upgraded from Class 3 or 4 to published status (1 or 2) through the receipt of the requested information.

During 1982, 31 packages were evaluated as Class 3. This number includes packages that had been Class 4 for twelve months or longer, packages that were replaced by newer packages, previously published packages that were reviewed and found to be obsolete or inoperable, and submittals that were evaluated as inappropriate for distribution by COSMIC. This number also includes packages which were made Class 3 as a result of an effort to remove all outdated packages from the COSMIC inventory prior to the publication of the COSMIC Software Catalog. Table V gives the current status of all packages received from each submitting source since the inception of COSMIC. The entries under 'Withdrawn' represent items previously Class 3 for which discard or return authorization has been received from the appropriate Technology Utilization Officer. From the table, 861 of the 1,305 programs available are submittals from the Langley Research Center, the Johnson Space Center, the Lewis Research Center and the Marshall Space Flight Center with each having approximately 200 programs currently available.

TABLE V

CUMULATIVE PACKAGE CLASSIFICATIONS BY CENTER

Center Mnemonic	Class 1	Class 2	Class 3	Class 4	In Process	With-drawn	Total
ARC	33	10	6	6	0	28	83
COS	0	17	0	1	0	65	83
DOD	0	47	16	3	0	16	82
ERL	6	7	0	0	0	1	14
FRC	5	6	0	0	0	4	15
GSC	77	41	4	6	2	217	347
HQN	15	10	0	0	0	72	97
KSC	5	22	2	0	0	80	109
LAR	166	60	4	7	1	77	315
LEW	131	77	1	5	1	86	301
MFS	95	109	28	9	2	1093	1336
MSC	84	139	9	5	1	784	1022
NPO	78	50	6	6	2	244	386
NUC	9	6	0	0	0	60	75
WLP	0	0	0	0	0	10	11
	704	601	76	48	9	2838	4276

Several noteworthy events took place in the area of software submittal processing during 1982. First, a new procedure was implemented in the checkout and evaluation process. Prior to checkout, all submittals now pass through a Pre-checkout Evaluation process. During this procedure, the submittal package is reviewed for completeness and general adherence to the software submittal guidelines. In addition, the level of effort required for checkout is estimated to aid the checkout programmer in budgeting his time.

Also, the approval of a microcomputer to support submittal processing should be mentioned. Since NASA is developing software not only on large and medium scale computers, but also on microcomputers, COSMIC requested, and had approved, the acquisition of a microcomputer. This microcomputer will provide for the checkout and dissemination of microcomputer software on floppy diskette. A notable example of the microcomputer software which COSMIC expects to receive is the recently submitted program NPO-15862 "SOFTCOST" authored by Robert C. Tausworthe. This program, and others of this caliber, should have a large demand in the public sector.

The third noteworthy event is the rewriting of the "COSMIC Software Submittal Guidelines". The original version of this document was written in April, 1976 with the latest addendum written in March, 1982. During 1982, the process of rewriting the entire document was initiated. A preliminary draft of the new "COSMIC Software Submittal Guidelines" was reveiwed by all the Technology Utilization Officers, COSMIC staff, and other appropriate NASA personnel. The new document is more user oriented and more applicable to today's hardware/software environment. Distribution of the new guidelines document through the NASA Technology Utilization Offices will occur in early 1983.

3

DISSEMINATION ACTIVITIES

DISSEMINATION ACTIVITIES

A summary of the program and document distributions for the contract period is given in Table VI.

TABLE VI

1982 SALES AND SERVICES SUMMARY

Total Items Invoiced	Volume	Value
Program Sales	506	$414,376.50
Document Sales	1,891	69,595.00
Lease Distributions	117	414,690.50
Miscellaneous Sales (Including catalogs)	928	23,379.11
	3,442	$922,041.11
NASA Distributions (No Charge)		
Programs	104	$ 86,180.50
Documents	267	10,778.00
Lease Distributions	41	137,220.00
Miscellaneous Sales (Including catalogs)	40	600.00
	452	$234,778.50

The total items invoiced includes all sales or lease distributions for which income can be expected. The contribution to the total invoiced value due to foreign distributions is $158,167.69, arising from 189 miscellaneous sales, 50 program sales, 236 document sales, and 3 leases. The lease distribution value of $414,690.50 derives from 85 leases and renewals of NASTRAN, and 32 leases of other programs. An analysis of Table VI indicates that approximately 45% of the total sales value of program products was derived from lease distributions.

The volume and value of DOD items invoiced during the year are shown in Table VII; these items are also included in the Total Items Invoiced as shown in Table VI.

TABLE VII

DISSEMINATION OF DOD ITEMS

	Volume	Value
Programs	32	$13,555.00
Documents	76	1,692.00
	108	$15,247.00

An analysis of the dissemination activities in 1982 (Table VIII) reveals 33 packages with a total invoiced sales value of more than $4,000.

For 1982, total COSMIC sales were $922,041.11. When compared with total sales for 1981, this represents an increase of 24%. This increase can be attributed in part to two factors: 1) a full year of sales since the general price increase went into effect on June 1, 1981, and 2) the large volume of sales (198 programs, 319 documents totaling $77,333.00) for the Hidden Line Computer Code. The program sales volume increased by 74% and program sales value increased by 40% in 1982 as compared to 1981. The total value of lease distributions (of which NASTRAN is the largest part) for 1982 is $414,690.50. When compared to 1981, this represents an increase of approximately 19%. These figures indicate that while NASTRAN is still an extremely prominent part of the COSMIC sales picture (documentation and leases of NASTRAN accounting for approximately 36% of total sales), the sale of other program products actually increased at a greater rate during 1982.

A comparison of package activity by volume of distributions is given in Tables IX and X, with Table IX listing the most active packages in terms of

TABLE VIII

MOST ACTIVE SOFTWARE PACKAGES BY TOTAL INVOICED PUBLIC SALES VALUE

PROGRAM NUMBER	PROGRAM ACRONYM/TITLE	DOCUMENTS VOLUME	DOCUMENTS VALUE	PROGRAMS VOLUME	PROGRAMS VALUE	TOTAL VALUE
HQN-10952	NASTRAN (IBM)	247	$13,623.50	39	$159,300.00	$172,923.50
ARC-11446	Hidden Line Computer Code	319	3,691.50	198	73,641.50	77,333.00
GSC-12600	NASTRAN (VAX)	0	-0-	18	71,120.00	71,120.00
HQN-10953	NASTRAN (CDC)	0	-0-	12	49,560.00	49,560.00
HQN-10954	NASTRAN (UNIVAC)	0	-0-	9	37,800.00	37,800.00
NPO-14892	MINI/VICAR	32	1,077.50	7	23,980.00	25,057.50
LEW-12973	NASCAP	4	693.00	3	22,650.00	23,343.00
ARC-11398	PANAIR	15	1,512.00	2	14,000.00	15,512.00
GSC-12671	SINDA (DEC VAX)	13	767.00	4	13,600.00	14,367.00
LEW-13392	PRESTO	13	392.00	10	13,025.00	13,417.00
GSC-12758	APT	2	830.00	5	12,500.00	13,330.00
HQN-10961	STAGSC-1 (CDC)	0	-0-	2	12,500.00	12,500.00
HQN-10967	STAGSC-1 (DEC VAX)	2	156.00	4	12,000.00	12,156.00
ERL-10013	ELAS (PERKIN ELMER)	11	702.00	3	11,325.00	12,027.00
LAR-11891	A Computer Code For Calculating The Super/Hypersonic Inviscid Flow Around Real Configurations	4	220.00	3	11,000.00	11,220.00
MFS-25464	PWB	22	803.00	4	10,400.00	11,203.00
GSC-11946	GTDS	6	1,504.50	2	9,240.00	10,744.50
LAR-11305	An Improved Method For The Aerodynamic Analysis Of Wing-Body-Tail Configurations In Subsonic And Supersonic Flow	6	412.00	3	9,750.00	10,162.00
GSC-12512	DOMONIC	11	640.00	2	9,000.00	9,640.00
MSC-18333	SYSTID	7	441.00	3	8,800.00	9,241.00
MSC-13805	SINDA (UNIVAC)	6	671.00	1	6,800.00	7,471.00
LEW-12966	Calculating Velocities And Streamlines On The Hub-Shroud Midchannel Stream Surface	5	205.00	4	7,200.00	7,405.00
LAR-12371	SPAR (MINI VERSION)(DEC VAX)	1	110.00	3	6,900.00	7,010.00
NPO-14893	IBIS/VICAR	7	1,704.00	2	5,013.00	6,717.00
LEW-11740	Calculation Of Complex Chemical Equilibrium Compositions	9	430.00	6	5,040.00	5,470.00
HQN-10962	STAGSC-1 (UNIVAC)	0	-0-	1	5,000.00	5,000.00
ARC-11224	Computer Programs For Calculating The Static Longitudinal Aerodynamic Characteristics Of Wing-Body-Tail Configurations	2	190.00	2	4,500.00	4,690.00
LAR-12953	ORACLS (IBM)	5	180.00	4	4,500.00	4,680.00
MSC-17563	Real Surface Radiation Interchange Factors	1	65.00	1	4,400.00	4,465.00
MSC-18721	FLAGRO4 (IBM)	13	294.00	3	3,960.00	4,254.00
ARC-10836	CONMIN	5	114.50	5	4,110.00	4,224.50
GSC-12783	TRASYS II (DEC VAX)	1	78.00	1	4,100.00	4,178.00
GSC-12802	General Maneuver Program	1	49.00	1	4,100.00	4,149.00

TABLE IX

MOST ACTIVE SOFTWARE PACKAGES BY VOLUME OF PUBLIC PROGRAM SALES

PROGRAM NUMBER	PROGRAM ACRONYM/TITLE	PROGRAM DISTRIBUTIONS	DOCUMENT DISTRIBUTIONS	PROGRAM SALES VALUE
ARC-11446	Hidden Line Computer Code	198	319	$ 73,641.50
HQN-10952	NASTRAN (IBM)	39	247	159,300.00
GSC-12600	NASTRAN (DEC VAX)	18	-0-	71,120.00
DOD-00065	NRLXRF	14	16	2,550.00
HQN-10953	NASTRAN (CDC)	12	-0-	49,560.00
NPO-15862	SOFTCOST	10	16	3,000.00
LEW-13392	PRESTO	10	13	13,025.00
HQN-10954	NASTRAN (UNIVAC)	9	-0-	37,800.00
NPO-14892	MINI/VICAR	7	32	23,980.00
LEW-11740	Computer Program For Calculation Of Complex Chemical Equilibrium Compositions, Rocket Performance, Incident And Reflected Shocks, And Chapman-Jouget Detonations	6	9	5,040.00
ARC-10836	CONMIN	5	5	4,110.00
GSC-12758	APT	5	2	12,500.00
LEW-10977	TSONIC	5	5	2,925.00
LAR-12953	ORACLS (IBM)	4	5	4,500.00
LAR-12727	PROFILE	4	5	3,775.00
HQN-10967	STAGSC-1 (DEC VAX)	4	2	12,000.00
GSC-12671	SINDA (DEC VAX)	4	13	13,600.00
NUC-10282	TAP-A	4	8	2,900.00
LEW-12966	Calculating Velocities And Streamlines On The Hub-Shroud Midchannel Stream Surface	4	5	7,200.00
MFS-25464	PWB	4	22	10,400.00

TABLE X

MOST ACTIVE SOFTWARE PACKAGES BY VOLUME OF PUBLIC DOCUMENT SALES

PROGRAM NUMBER	PROGRAM ACRONYM/TITLE	DOCUMENT DISTRIBUTIONS	PROGRAM DISTRIBUTIONS	DOCUMENT SALES VALUE
ARC-11446	Hidden Line Computer Code	319	198	$ 3,691.50
HQN-10952	NASTRAN (IBM)	247	39	13,623.50
NPO-14892	MINI/VICAR	32	7	1,077.50
MFS-25464	PWB	22	4	803.00
LAR-12794	TAP 2	18	3	446.50
DOD-00065	NRLXRF	16	14	427.50
NPO-15862	SOFTCOST	16	10	608.00
ARC-11398	PANAIR	15	2	1,512.00
MSC-18178	MATHPAC	15	2	864.00
MSC-18721	FLAGRO4 (IBM VERSION)	13	3	294.00
LEW-13392	PRESTO	13	10	392.00
GSC-12671	SINDA (DEC VAX)	13	4	767.00
LAR-12919	PPARS	12	1	348.00
NPO-14610	SDDL	12	2	328.50
MFS-25183	LOGSIM	12	1	420.00
GSC-12512	DOMONIC	11	2	640.00
ERL-10013	ELAS (PERKIN ELMER)	11	3	702.00
GSC-11947	PUZZLE	10	1	257.50
GSC-12367	PLOTPAK	10	-0-	318.50
GSC-12708	MARS	10	1	310.00
LAR-12854	PATH PASCAL	10	2	247.50
LEW-13145	NASA PERT TIME II	10	1	225.00

the number of copies of public program sales and Table X listing the most active packages in terms of public document sales. Table IX lists 20 packages for which four or more distributions of program code occurred. The Hidden Line Computer Code dominates this group of most active program packages. NASTRAN (NASA Structural Analysis System), NRLXRF (A Fortran Program for X-Ray Flourescence Analysis), SOFTCOST (Deep Space Network Software Cost Estimation Model), and PRESTO (A Computer Code for the Performance of Regenerative Superheated Steam-Turbine Cycles) are also in this group of popular programs.

To summarize invoiced sales, COSMIC processed 623 program orders, including 117 lease distributions during 1982, and 1,891 document orders. Excepting lease distributions, 506 program orders were filled at an average value of $819 for each distributed program. This compares with 291 program orders filled at an average value of $1,016 for 1981. These figures indicate that during 1982, COSMIC sold a higher number of programs at a lower average price when compared to 1981. This can be attributed to the fact that the Hidden Line Computer Code with its low price ($370.00) sold 198 copies representing 39% of total sales. The number of distinct packages involved in all distributions was 588 for 1982.

The leading software packages distributed to NASA facilities for which no charge was made are listed in Table XI. The total number of programs distributed to NASA centers in 1982 was 145 (including leased programs) with 267 documents supplied, and 40 miscellaneous sales (including catalogs), having a combined total value of $234,778.50. When compared with 1981, the volume of programs distributed to NASA increased by 113% and the total value of all items distributed to NASA increased by 82% in 1982.

Characterization of the software packages disseminated during 1982 shows that 38 packages were distributed to NASA only and 461 to the public only with a total distribution of 588 different packages. This represents 45% of the approximately 1,307 items in the inventory. The published inventory is not static because of additions and deletions. One hundred twenty-seven (127) different packages were distributed to NASA sites, 89 of which were common to both the NASA and non-NASA distribution lists (Table XII).

Comparisons of 1982 invoiced sales by state are shown in Figure 2. The states with the greatest dollar value of sales were California ($136,288.00), Pennsylvannia ($68,372.50), Texas ($56,120.00), and New York ($52,871.00).

Comparisons of the invoiced sales by year since charges were instituted in 1968 are shown in Table XIII and Figure 3. The peak for 1971 occurred when NASTRAN Level 12 was released, with some sales of this version carrying over into 1972. The peak in 1973 can be attributed to the release of Level 15.1 of NASTRAN. Some sales of NASTRAN Level 15.5 are included in 1974 and 1975, although sales were lower than for previous releases of NASTRAN, apparently

TABLE XI

MOST ACTIVE SOFTWARE PACKAGES DISTRIBUTED TO NASA

PROGRAM NUMBER	PROGRAM ACRONYM/TITLE	DOCUMENTS VOLUME	DOCUMENTS VALUE	PROGRAMS VOLUME	PROGRAMS VALUE	TOTAL VALUE
HQN-10952	NASTRAN (IBM)	108	$5,080.00	9	$34,440.00	$39,520.00
GSC-12600	NASTRAN (DEC VAX)	0	-0-	9	36,400.00	36,400.00
HQN-10954	NASTRAN (UNIVAC)	0	-0-	5	17,010.00	17,010.00
NPO-14893	VICAR/IBIS	3	639.00	2	7,200.00	7,839.00
GSC-12758	APT	0	-0-	3	7,500.00	7,500.00
ARC-11398	PANAIR	0	-0-	1	7,000.00	7,000.00
GSC-12810	DISCOS (DEC VAX)	1	41.00	3	5,400.00	5,441.00
GSC-12512	DOMONIC	1	54.50	1	5,200.00	5,254.50
GSC-12079	SMIPS	1	27.50	1	5,075.00	5,102.50
HQN-10967	STAGSC-1 (DEC VAX)	1	52.00	1	5,000.00	5,052.00
HQN-10962	STAGSC-1 (UNIVAC)	0	-0-	1	5,000.00	5,000.00
MSC-20270	LARSFRIS	0	-0-	1	5,000.00	5,000.00
ARC-11446	Hidden Line Computer Code	14	161.00	13	4,810.00	4,971.00
NPO-14892	MINI/VICAR	2	49.00	2	4,360.00	4,409.00
ERL-10013	ELAS (PERKIN ELMER)	1	58.50	1	3,775.00	3,833.50
MSC-13805	SINDA (UNIVAC)	4	404.00	1	3,400.00	3,804.00
GSC-12684	Spire Data Base Management System	1	24.00	1	3,775.00	3,799.00
GSC-12422	DISCOS (IBM)	1	78.00	2	3,600.00	3,678.00
GSC-12326	WCPP	4	160.00	3	3,375.00	3,535.00
MFS-23539	FACES	1	24.00	1	3,450.00	3,474.00
GSC-12367	PLOTPAK	4	98.00	3	3,375.00	3,473.00
LAR-12371	SPAR (MINI VERSION)(DEC VAX)	0	-0-	2	3,470.00	3,470.00
MFS-23813	NASA Structured Fortran Preprocessor	4	94.00	3	2,835.00	2,929.00
MFS-25464	PWB	1	36.50	1	2,600.00	2,636.50
LAR-12313	ORACLS (CDC)	3	108.00	2	2,251.00	2,359.00
DOD-00072	UPLOTE	2	37.00	1	2,065.00	2,102.00

TABLE XII

NUMBER OF DIFFERENT COSMIC SOFTWARE PACKAGES DISTRIBUTED

DISTRIBUTION	NUMBER OF COSMIC ITEMS
NASA Sites Only	38
NASA and Public	89
Public Only	461
	588

due to delays in obtaining documentation and to a premature announcement of Level 16 release. Distributions in 1976 include the value of 16 leases of Level 15.9 NASTRAN at a value of $43,800 and of 3 leases of Level 16 NASTRAN at a value of $11,200. Fiscal year 1977 was for a period of eighteen months, but when adjusted to twelve months 1977 was another peak year. This corresponds to the release and market adoption of NASTRAN Level 16. The figures for 1977 include the value of one lease of Level 15.9 NASTRAN at a value of $3,000, the

TABLE XIII

COSMIC TOTAL SALES

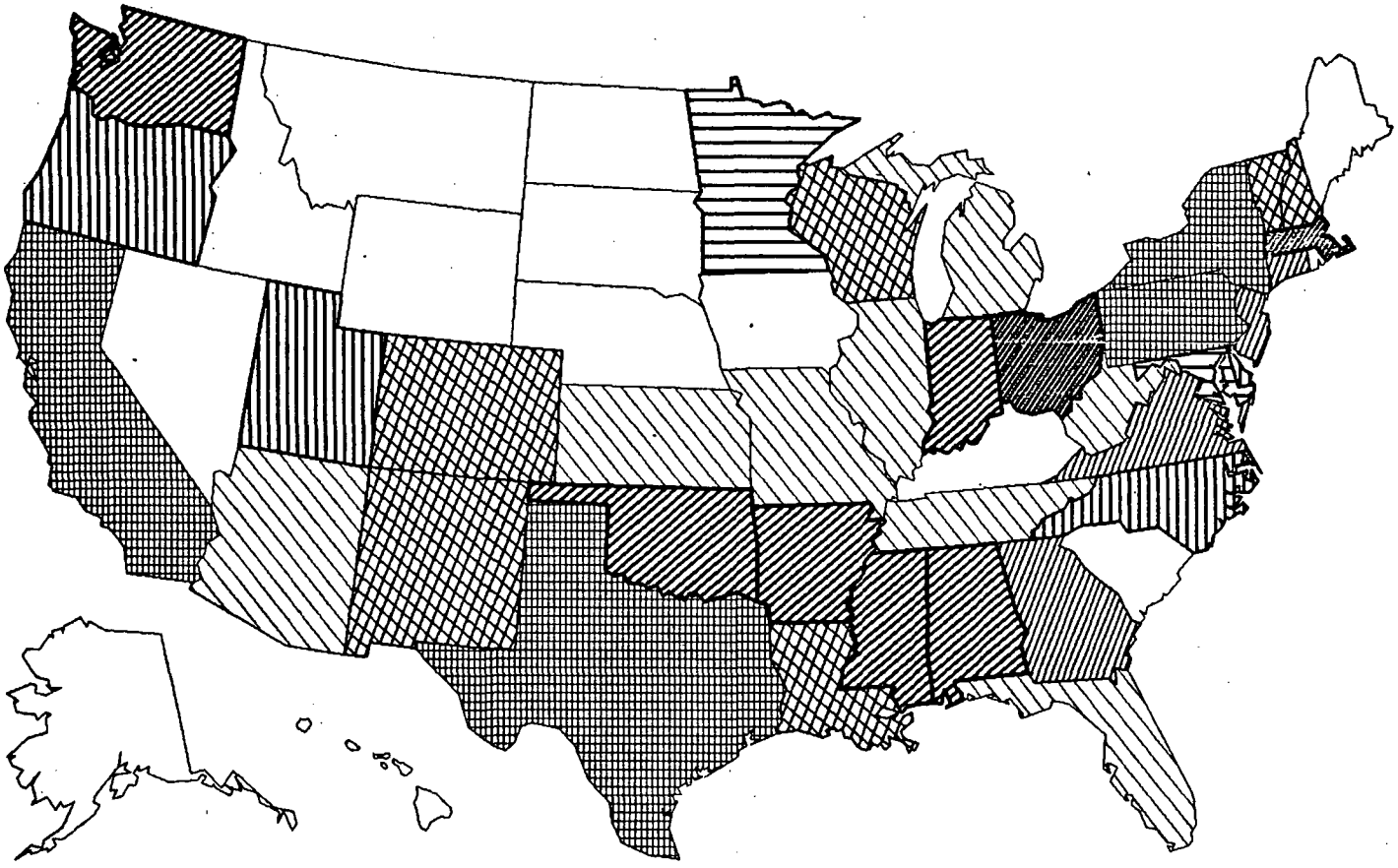
	ITEMS INVOICED					NASA DISTRIBUTIONS (No Charge)				
FISCAL YEAR	PROGRAMS VALUE	PROGRAMS VOLUME	DOCUMENTS VALUE	DOCUMENTS VOLUME	TOTAL VALUE	PROGRAMS VALUE	PROGRAMS VOLUME	DOCUMENTS VALUE	DOCUMENTS VOLUME	TOTAL VALUE
1967-68	$ 29,802	423	$ 8,735	2567	$ 38,537	$ 5,250	182	$ 318	92	$ 5,568
1968-69	52,785	177	16,205	2506	68,990	16,450	110	1,974	159	18,424
1969-70	87,641	216	18,814	1754	106,455	16,045	114	4,212	262	20,257
1970-71	162,746	310	25,309	1925	188,055	25,060	135	2,995	196	28,055
1971-72	101,580	277	30,292	1813	131,872	30,630	143	6,069	258	36,699
1972-73	160,137	335	61,393	5903	221,530	48,915	101	3,616	273	52,531
1973-74	140,228	298	42,992	4844	183,220	34,261	89	5,735	543	39,996
1974-75	101,899	207	38,584	3479	140,483	40,023	71	3,636	259	43,659
1975-76	164,217	172	39,374	3327	203,591	54,710	50	5,109	286	59,819
1976-77*	357,260	344	67,751	3872	425,011	56,860	66	15,222	582	72,082
1977-78	377,832	343	56,360	2681	434,192	62,560	62	5,372	209	67,932
1978-79	396,319	359	89,725	3118	486,044	74,145	67	7,508	332	81,653
1979-80	460,618	400	78,056	3385	538,674	68,790	70	7,253	232	76,043
1980-81	643,027	404	99,215	3392	742,242	121,675	68	7,238	260	128,913
1981-82	829,067	623	92,974	2819	922,041	223,400	145	11,378	307	234,778

*FY 77 was an eighteen-month period, July 1, 1976, through December 31, 1977.

COSMIC SALES BY STATE

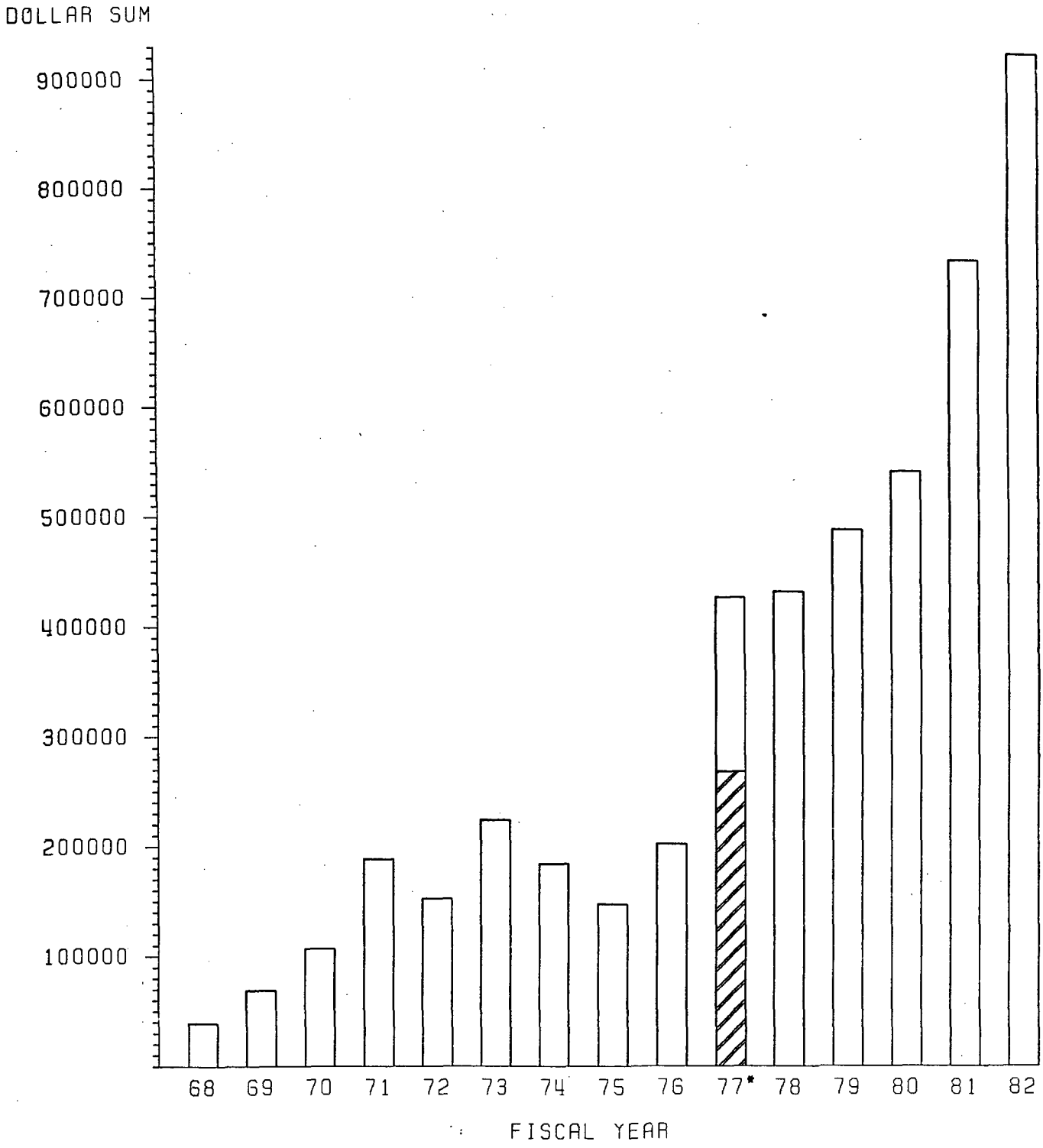
1982 ANNUAL SALES

FIGURE 2



LEGEND: SALES

- UNDER $500
- $501-1,000
- $1,001-5,000
- $5,001-10,000
- $10,001-20,000
- $20,001-30,000
- $30,001-40,000
- $40,001-50,000
- OVER $50,000



*EIGHTEEN-MONTH REPORTING PERIOD, JULY 1, 1976, THROUGH DECEMBER 31, 1977.
SHADED AREA REPRESENTS COMPARABLE TWELVE-MONTH DATA.

FIGURE 3

COMPARISON OF INVOICED SALES BY YEAR

value of 38 leases of Level 16 NASTRAN at a value of $135,100, and the renewal value of 17 Level 16 NASTRAN leases at a value of $187,900. 1978 was by far the best year for total sales value for COSMIC up until that time, even better than the eighteen-month period of 1977. 1979 showed an increase in COSMIC sales, even above 1978. The largest single influence in these figures again was NASTRAN. Total lease distributions (which included a small amount derived from program products other than NASTRAN), amounted to $244,778, all other sales (including programs, documents, and miscellaneous items) amounted to $241,256. Thus, lease distributions accounted for approximately 51% of the total COSMIC sales value in 1979. Sales continued to increase during 1980. As in previous years, NASTRAN was the largest single influence in COSMIC sales. Lease distributions were $268,011 of a total sales figure of $538,674. As in 1979, total lease distributions accounted for approximately 50% of the total COSMIC sales value for 1980. Sales value for 1981 increased at a greater level than the increase for all previous years, excluding the eighteen-month reporting period of 1977. Again the largest single influence in COSMIC sales was NASTRAN. Total lease distributions amounted to $347,467.50, all other sales totaled $394,774.88. Thus, lease distributions accounted for approximately 47% of the total COSMIC sales value in 1981. Sales continued to increase during 1982. As in previous years, NASTRAN was the largest single influence in COSMIC sales. Lease distributions were $414,690.50 of a total sales figure of $922,041.11. Thus, lease distributions accounted for approximately 45% of the total COSMIC sales value in 1982.

4

CUSTOMER SERVICES AND MARKETING ACTIVITIES

CUSTOMER SERVICES AND MARKETING ACTIVITIES

CUSTOMER SERVICE

During 1982, the total number of customer searches performed (in response to letters, TECH BRIEFS, and telephone inquiries) was 6,235 (up from 5,354 in 1981). This is divided into domestic inquires (5,827) and foreign inquires (408). In addition 43 customer problems were handled during 1982. These problems ranged from needing a replacement tape to requiring a person at a NASA site to answer questions on a particular package.

The purchasers of COSMIC program products in 1982 represented 25 non-communist countries in addition to the United Sates. As a matter of policy, all inquiries from communist bloc countries are forwarded to NASA Headquarters for response and are not included in our statistics. The 1,705 United States purchasers of COSMIC products represented 1,321 different companies or organizations from 49 states plus Washington D.C. Most of these purchasers, as expected, were concentrated in the more industrialized areas of the country.

MARKETING

In 1982 the beginning of an overall COSMIC marketing plan was formalized. The first steps were to define marketing and then define COSMIC's marketing concept. Marketing functions include the pricing, promotion, distribution and planning of the product. COSMIC's marketing concept is: A total system of interacting activities designed to plan and review the implimentation of

pricing, promotion and distribution activities of NASA software and selected services to present and potential customers. The area discussed in this section of the annual report will be promotional activities.

The role of promotion is to communicate ideas and information about a company and its products. There are two types of promotion: institutional promotion and product promotion. In COSMIC's case, institutional promotion involves promoting our link with NASA and the technology transfer program. Product promotion involves promoting specific software products.

The promotion mix for a product or organization consists of three major promotional methods: advertising, publicity, and sales promotion.

During 1982, COSMIC has continued many of the promotional activites initiated previously with increased emphasis. The primary thrusts of these activities were:

The continued solicitation of gratis publicity of computer programs available from COSMIC in the technical press and trade journals.

The increased attendance at trade shows and professional society meetings to promote the services and software available from COSMIC.

The preparation of abstract collections from groups of programs in the same general subject category and the updating of program summaries.

The use of various media for the general promotion of COSMIC.

The use of Benefits Analysis to highlight COSMIC's end results and to assist in marketing decisions.

ADVERTISEMENTS. Advertising is a paid form of communication about an organization and its products. It is transmitted to a target audience through a media such as newspapers or magazines, trade shows, and direct mail. During 1982, COSMIC did not advertise in any publications; however, plans are being made to begin this advertising activity in 1983.

Conferences and Meetings. COSMIC staff members participated in professional meetings or trade conferences during 1982 to promote software and services available through the center. Typically, participation included informal presentations describing particular packages of interest to the attendees and the distribution of promotional material (brochures, catalogs, and abstracts). A list of the meetings attending is provided below:

9th Energy Technology Conference, Washington, DC
Aerospace/Defense Conference, Los Angeles, CA
Harvard Computer Graphics Week, Boston, MA
5th World Energy Engineering Congress, Atlanta, GA

At each of the above conferences, COSMIC rented a display area for distributing material.

In addition to the list above, COSMIC promotional material was distributed at the following conferences on our behalf even though COSMIC personnel were not in attendance:

Carnegie-Mellon University Computer Graphics Symposium, Pittsburgh, PA

Purdue University Laboratory for the Applications of Remote Sensing (LARS) Short Course, Lafayette, IN.

In addition to the conferences where COSMIC promotional material was distributed, COSMIC attended the CDC sponsored International Exposition on Technology Transfer 82 as an agenda speaker.

Attendance at conferences and trade shows continues to be an excellent way for COSMIC to gain wide public exposure and acceptance.

Direct Mail. In 1982 COSMIC used direct mail to 1) notify current customers of program corrections, 2) notify current customers of program updates, and 3) notify potential customers of new COSMIC software.

Corrections and update announcements for COSMIC programs were mailed to current customers throughout 1982.

The following mailing campaigns were initiated in 1982:

(Jan.) A mailing to 800 subscribers of the NASTRAN Newsletter and 1200 structural engineers/AIAA members announcing the 10th NASTRAN Users Colloquium.

(Feb.) A 100 piece mailing to attendees of the OSU 7th Applied Mechanisms Conference. This mailing highlighted COSMIC and structural analysis software.

(May) A 400 piece mailing to potential customers for ARC-11446 (Hidden Line Code). These names were supplied by NASA Dryden Facility.

PUBLICITY. Publicity is communication in a news story form regarding an organization and its products that is transmitted through a mass medium at no charge.

News Releases: COSMIC has continued efforts to solicit gratis publicity in the technical journals and trade magazines. The level of activity in the marketing area is reflected in Table XIV and Table XV which list the announcement that appeared in various publications, and the number of information requests resulting from these announcements. The 36 announcements listed (excluding NASA publications) were carried in 26 magazines, newsletters, or journals resulting in a total of 1,110 reported requests. NASA publications, primarily TECH BRIEFS, generated 2,513 requests. As new programs are added to COSMIC's inventory, an attempt is made to locate journals in those fields which are not already on our mailing list. They are then added and attempts are made to contact by phone to determine which staff member should receive news releases. A general release on COSMIC and the specific program news release are then mailed. A reply card asking whether the release will be published, and in which issue, and whether the editor wishes

TABLE XIV

ANNOUNCEMENTS PUBLISHED

PUBLICATION	DATE	ARTICLE
CEPA Newsletter	Jan. 82	LAR-12816
NEAS	Dec. 81	LAR-12926
ICP Software Business Review	Spring 82	GSC-12747
Urban & Regional Info. Sys. Assoc. Newsletter	Feb. 82	GSC-12747
Software News	Mar. 82	GSC-12669
Electronic Design	Feb. 82	LAR-12313
Electronic Design	Feb. 82	MSC-20183
NEAS	Mar. 82	DOD-00082
Computer Graphics World	Apr. 82	ARC-11446
Energy Today	May 82	NPO-15440
Aerospace Daily	May 82	General
Business Aviation	May 82	General
Electronic Engineering Times	June 82	ARC-11446
Harvard Graphics	June 82	ARC-11446
General Aviation News	June 82	LAR-1294
Aviation Daily Newsletter	July 82	General
Electronic Design	July 82	Software Test
CEPA Newsletter	Sept. 82	LAR-13004
Computer Graphics World	Sept. 82	ARC-11446
NEAS Newsletter	Sept. 82	NASTRAN News GSC-12833 GSC-12422 LAR-12888 COSMIC Catalog
Aerospace Daily	Sept. 82	LAR-13039
Systems & Software	Oct. 82	CAD/CAM
Hard Copy	Oct. 82	DOCLIB
Saving Energy	Oct. 82	ESEA
Computerworld	Oct. 82	SOFTCOST
Airport Services Mgt.	Sept. 82	LEW-13778
Computer Decisions	Nov. 82	MIRADS
Energy Planning Network	Sept. 82	Energy
Systems & Software	Nov. 82	NPO-15862
Applied Optics	Nov. 82	SHCOST
NEAS	Nov. 82	DESAP2
AEC Automation Newsletter	Dec. 82	ARC-11446
Southeastern Conductor	Nov. 82	General
Adjustor Magazine	Dec. 82	ARC-11132
EDP Performance Review	Dec. 82	Sys. Dev.
Turbomachinery International	Dec. 82	Turbomachinery

TABEL XV

INFORMATION REQUESTS RECEIVED

REQUESTS

Publication	Total Number
Tech Briefs	
Spring 80	8
Summer 80	16
Fall 80	16
Winter 80	16
Spring 81	32
Summer 81	433
Fall/Winter 81	781
Spring/Summer 82	1211
	2513
Oil & Gas Journal	3
ICP	45
Electronic Design	353
Software News	11
Hydrocarbon Processing	28
Solar Energy Intelligence Report	10
Business Aviation Week	3
Aerospace Daily	12
Electronic Engineering Times	45
Aviation Week	6
General Aviation News	6
Aviation Daily	11
Harvard Computer Graphics	2
Datapro	20
Computer Graphics World	462
Computerworld	1
Hardcopy	5
Airport Services Management	8
Saving Energy	4
Systems & Software	35
Computer Decisions	38
SE Semiconductor	2
	1110

to remain on our mailing list is also included with the initial news release and with all ongoing contacts. Currently 74 journal titles are included on the mailing list. They represent the following seven categories of programs: aeronautics, energy, engineering, data processing, computer graphics, heat transfer, and turbomachinery.

Those publications which showed the greatest response were Electronic Design and Computer Graphics World. Table XV may understate the true value of these announcements because many customer inquiries do not actually reference the publications which prompted their inquiry.

Although direct contact is usually made with a magazine before any announcement is published, some abstracts and general information articles are published in magazines or journals without COSMIC's prior knowledge. Although problems sometimes do arise when inaccurate information is printed, COSMIC welcomes this unsolicited promotion.

Software Directories/Databases: COSMIC continually updates program abstracts which appear in software directories or software databases. Compilations of abstracts representative of the COSMIC program library have appeared in the following directories or databases:

* NASA RECON Systems
* DATAPRO Software Directory
* EDP Performance Review
* ICP Interface
* ICP Software Directory
* 9th DEC Engineering Software Catalog
* CDC TECHNOTEC
* Computers for Design and Construction Directory
* International Directory of Software
* SOFTSEARCH
* IMPRINT SOFTWARE
* IBM Software from non-IBM Sources Directory

Typically, the abstracts which appear in these publications pertain to several different application areas which are determined by the publisher.

Outside Publicity: In October, 1982, several color transparencies of COSMIC benefits cases were delivered to the TU Office at the NASA Marshall Space Flight Center. These photos were incorporated into the Technology Transfer display at the Alabama Space and Rocket Center in Huntsville. In December, material was sent to a group at Oklahoma State University to be included in the "traveling exhibit" being assembled under contract to the Johnson Space Center Public Affairs Office. This exhibit will be available for use by non-profit groups to visually depict the benefits of NASA technology for industry. The exhibit is scheduled for completion in the summer of 1983.

SALES PROMOTION. Sales promotion is an activity and/or material that acts as a direct inducement offering added value or incentive for the product to re-sellers, salespeople, or consumers.

Program Summaries and Abstract Collections: The program abstracts that are written for each computer program available from COSMIC attempt to provide sufficient information for a prospective customer to make a decision concerning the appropriateness of the purchase of the documentation or program code. Some programs, however, are so complex and the supporting documentation so voluminous that an abstract is inadequately descriptive. For these systems, COSMIC has prepared more extensive technical synopses, called program summaries, which are distributed at no cost. The program summaries are generally ten to twenty page condensations of the program documentation. Usually, these summaries include a description of the program's application and design as well as a discussion of the system requirements for implementation and use.

Abstract collections contain approximately fifteen to twenty abstracts of programs in the same general subject area. These are distributed when customers request program abstracts in one particular category such as image processing.

A total of 19 program summaries and abstract collections have been prepared to date. The software packages for which program summaries have been prepared are: DYLOFLEX - Dynamic Loads Analysis of Flexible Aircraft with Active Controls; CADAT - Computer Aided Design and Testing (of LSI Circuits); NASTRAN - NASA Structural Analysis Program; VICAR/IBIS - Video Image Communication and Retrieval System; SPAR - Structural Performance and Redesign Program; and PANAIR - A Computer Program For Predicting Subsonic or Supersonic Linear Potential Flows about Arbitrary Configurations Using a Higher Order Panel Method. Abstract collections are in the areas of Structural Analysis, Domestic Image Processing, Energy Conservation, International Image Processing, System Development and Programming Aids, Heat Transfer and Fluid Flow, Project Management, Ship Design, Aerodynamics, Data Management and Analysis, Trajectories and Orbital Mechanics, Turbomachinery, and Software for the VAX User.

During 1982 the NASTRAN summary was updated and the POST program summary was replaced by the Trajectories and Orbital Mechanics collection. Turbomachinery and Software for the VAX User were new collections for 1982.

COSMIC Catalog: The COSMIC catalog continues to be the basis of the COSMIC sales promotion function. The 1982 version of the catalog (both domestic and international) was available in two formats: a computer magnetic print tape for $50.00 ($100.00 International) and a set of 24x or 48x microfiche for $10.00 ($25.00 International). In addition to the abstracts,

both versions contained a brief introduction to COSMIC, a Subject Category Index, and a Keyword Index.

The number of sales for both the domestic and international versions of the catalog during 1982 were:

	Domestic	International
Microfiche	529	75
Tape	170	34
	699	109

During 1982 the 1983 version of the COSMIC catalog was produced. Re-titled as the 1983 COSMIC SOFTWARE CATALOG, this version contains two new indexes. A Title Index and an Author Index have been added to compliment the Subject and Keyword indexes already available. The 1983 version also has an entirely rewritten introduction (both tape and microfiche) which will help catalog users to better understand and use the catalog. The 1983 version is available for the same cost as the 1982 version.

In 1982 a mass mailing was prepared to notify all previous purchasers of the COSMIC catalog that a 1983 version will be available in early 1983. This direct mailing (2,000 total) will be sent in early January 1983.

GENERAL PROMOTION. The marketing activities previously mentioned are those carried out on a regular yearly basis. Some activities are initiated because of a particular need or with a particular promotion goal in mind.

In 1982 COSMIC received 5,000 copies of a new four-color brochure for use in promotional activities. This 12 page brochure highlights recent benefits cases in various areas and briefly explaines COSMIC and the inventory. This brochure will be used at selected trade shows and technical meetings, for visitors, for news releases and whenever a more detailed explanation of COSMIC is needed.

Twice in 1982 foreign naval officers on temporary duty at the Naval Supply Corps School in Athens were vistors at COSMIC. These officers (2 groups of 20 each) were given a tour of COSMIC and the University's computing facility. Each officer was also given a COSMIC brochure, a SPINOFF 82, and information on the catalog. The officers were mostly from European and Far Eastern countries.

Plans were finalized in 1982 for a COSMIC display booth. This booth will be used in upcoming trade shows and meetings. Delivery is expected in February 1983.

COSMIC has also made an effort to join organizations which will help COSMIC's overall promotional activities. Two such organizations of which COSMIC is now a member are the Technology Transfer Society (T^2S) and the Southeastern Direct Mail Marketing Association.

During the summer of 1982 the marketing department of the college of Business Administraction at the University of Georgia was contacted concerning the use of student help in formulating a overall COSMIC marketing plan. These students (an MBA marketing class under the direction of Dr. William French) were divided into 6 groups, and each group was instructed to develope a 1-3-5 year marketing plan for COSMIC. The resulting plans were to be used as a basis and a guideline for COSMIC to begin developing its own plan. Each of the plans offered different suggestions and ideas for COSMIC to improve its marketing capabilities. The combination of the 6 plans gives COSMIC an insight on its marketing needs. Each class member received a thank you letter and a picture of the shuttle from NASA Headquarters.

BENEFITS IDENTIFICATION TASK

The benefits analysis activity involves contacting users of COSMIC - supplied programs in order to record the benefits or value these programs provide to industry. When sufficient information can be provided by the company, written reports are prepared, describing their application(s) of the particular code. If the company can determine savings in time or dollars or if particular new capabilities are provided by using NASA sponsored software, this information is included in the reports. During 1982, increased emphasis was placed on using the benefits reports as marketing tools. For example, the mew four-color brochure features fourteen benefits cases illustrated with color photos.

A new section in SPINOFF 1982 reviewed "Computer Technology for Industry" and focused on COSMIC's services with thirteen benefits reports and accompanying photos. Photos and authorized releases were secured for seven additional benefits reports that are scheduled for publication in SPINOFF 1983.

Also in 1982, COSMIC initiated a policy of sending copies of authorized benefits reports to the center where the program originated. This feedback to the TU officers and program authors is an attempt to increase their awareness that the programs have provided benefits to industry beyond the original NASA project use. During the year, a total of 28 benefits reports were forwarded to the various centers.

During 1982, a total of 54 benefits interviews were completed. Sixteen of these interviews included sufficient information to prepare written reports. These were submitted to the interviewee for editing and signed authorization from the appropriate company representative, granting permission for COSMIC to release the report. Three of these reports were returned to

COSMIC with a letter stating that company policy prevented authorizing release; two reports are currently on hold waiting for company action. A total of eleven reports were authorized for release by various companies during 1982.

These eleven companies reported a variety of applications for the NASA sponsored software - from Western Electric's analysis of the design of semiconductor wafers to FMC Corporation's analysis of critical load capacity for crane booms on construction machinery they manufacture. Three companies were able to determine time or dollar savings that resulted from the availability of the specific program:

Air Research Manufacturing NPO-13197	400-500 man-hours
Boeing Commercial Airplane LAR-12313	2 man-years
Western Electric MFS-21075	6 man months

United Information Services reported that they have opened a new marketing effort for computer service using the capability of a code supplied by COSMIC, HQN-10947.

In April 1982, a new program, the Hidden Line Removal Code, developed at NASA Dryden, entered COSMIC's inventory. Because of its heavy sales activity (198 programs sold during the year), attempts were made to contact users for benefits information that might be useful for additional marketing activities. Four of the interviews provided enough information to prepare a written report. Only one of those reports had been signed and returned for release at the end of the 1982 reporting period. That report, from Nebraska Public Power District is included on the following pages as an example of the benefits activity.

NASA
National
Aeronautics and
Space
Administration

SOFTWARE BENEFITS REPORT

The following report describes one application of software developed as part of a project funded by the National Aeronautics and Space Administration. The Computer Software Management and Information Center (COSMIC) operates as an extension of NASA's Technology Utilization Program to supply NASA computer programs to other agencies and the private sector. For additional information on this or other NASA software packages, call or write COSMIC.

Program Title: Hidden Line Computer Code

Program Number: ARC-11446

NASA Center: Dryden Flight Research Facility

The Nebraska Public Power District (NPPD), a combination public corporation and subdivision of the State of Nebraska, operates an integrated electric utility system with facilities for the generation, transmission, and distribution of electric power to 350 cities, towns, and other power districts in Nebraska.

Several engineering offices at NPPD are using a software package developed at the NASA Dryden Flight Research Facility. This Hidden Line Computer Code has applications for many engineering projects requiring three-dimensional drawings or graphics. One use of this code by NPPD has been for generating drawings of substation site locations. Surveys are taken of the proposed site before any groundwork or construction has

begun. A preliminary drawing is made by computer using the hidden line removal code. Additional drawings of different viewpoints are then generated to represent the site after construction. Engineers can visually determine the most effective design of the earthwork and structure to ensure the construction will blend well with the environment.

Another NPPD application of the hidden line code involves the drawing of welded connections, metal plates joined together as connections in transmission towers. Initial computer drawings contain many overlapping lines; removal of these lines eliminates distortion and confusion. Other hidden line codes have been evaluated for this process, as well as hand drawings by draftsmen. However, these approaches were very time consuming and expensive, and were not justifiable for repeated use, compared to using the Dryden code.

NPPD operates one nuclear power station, and engineers at this facility have also found the Hidden Line Code to be a significant improvement over other programs for plotting complex shapes. They use the code to graphically depict a three-dimensional simulation of the power distribution in the nuclear reactor. The goal for efficient power production is to keep the power generation equal in all areas. Graphically displaying these levels aids in determining whether power generation in any one area needs to be suppressed or increased for greater efficiency.

The fourth application of this code currently underway at NPPD involves the distribution planning staff's use of the code to generate three-dimensional bar charts showing power usage in individual towns served by the district. All NPPD groups using the Hidden Line Code report that they have been extremely satisfied with its speed and accuracy as well as it's low CPU resource requirements. The code has more than paid for itself in the first few months of use by expanding their capability to generate three-dimensional drawings.

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MAINTENANCE AND SUPPORT OF SELECTED COMPUTER PROGRAMS

MAINTENANCE AND SUPPORT OF SELECTED COMPUTER PROGRAMS

COSMIC began maintaining and providing support to the NASTRAN® Structural Analysis Program in May, 1979. Prior to that time, the NASTRAN® System Maintenance Office (NSMO) at the NASA Langley Research Center, Hampton, Virginia, was responsible for maintaining NASTRAN® . In June, 1979, the University of Georgia issued a Request for Proposal (RFP) to obtain support for maintaining NASTRAN® . A subcontract was awarded to the Computer Sciences Corporation in November, 1979, to provide support for the maintenance of the NASTRAN® system.

Computer Sciences Corporation assigned the following personnel to the NASTRAN team:

Mr. W. E. Wagner, Operations Manager
Dr. P. R. Pamidi, Project Manager
Mr. E. S. Srinivasan
Mr. V. Soule
Mr. M. Lin
Mr. R. Strang
Mr. Paul Hallford, Consultant
Mr. Tom Butler, Consultant
Mr. Keith Brown, Consultant

In May 1982, Sperry Systems Division in Huntsville Alabama became the NASTRAN maintenance subscontractor. Sperry assigned the following personnel to the NASTRAN team:

Mr. Ronald Shmitz
Mr. Horace Turner
Mr. Gordon Chan
Mr. David Harper
Ms. Cheryl Poe
Mr. Dennis Glover
Mr. Gordon Mathews

Sperry solved fifty-three SPR's for incorporation into the April 83 release of NASTRAN. In addition Sperry continued the effort of incorporating the following new capabilities into NASTRAN:

- BANDIT
- NSRDS STRESS Averaging Capability
- MSFC Hydroelastic Capability
- Hidden Line Capability
- Elbow Element
- Converting the Univac to ASCII

The 10th NASTRAN Users' Colloquium was held in New Orleans in May. Approximately 80 people registered for the two day session. The colloquium papers were printed and released as NASA-CP-2249, "Tenth NASTRAN Users' Colloquium".

The 11th NASTRAN Users' Colloquium is scheduled for San Francisco in May 1983. In addition to the two day presentation of technical papers, there will be two days for workshops and a day devoted to discussing the new enhancements.

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SPECIAL PROJECTS

SPECIAL PROJECTS

During this year, three special tasks received significant effort. The first task was the continued development of the COSMIC Abstract Recording System (CARS) Project; the second was continuation of the Microfiche Project; and the third was the Customer Information System Project. Each of these tasks is discussed in the following paragraphs:

ABSTRACT RECORDING PROJECT

The purpose of the COSMIC Abstract Recording System (CARS) Project is to develop and maintain a data base containing machine-readable copies of COSMIC program abstracts. There are three basic reasons for developing and maintaining an abstract recording system. First, it will serve as a permanent, single storage repository for all program abstracts; therefore, the currency of these recorded copies of program descriptions can easily be maintained. Second, it will naturally augment the controlled data elements previously generated in the Program Inventory Indexing Project by providing machine search access not only through assigned index terms and subject classifications but also through free text expressions. Third, it will provide an extremely convenient data source for the computerized production of formatted print tapes and listings which can be used to prepare hardcopy catalogs and announcements.

During previous contract periods, the abstract data base was designed and created. The process of maintaining this data base continued during 1982. New program abstracts were added to the data base as they entered the COSMIC inventory and existing program abstracts were edited as required. As a result of this updating process during the contract year, the COSMIC abstract data

base currently contains 2,621 abstracts. Of this total, 702 abstracts describe Class 1 programs, 602 abstracts describe Class 2 programs, 719 abstracts describe Class 3 programs, 3 abstracts describe Class 4 programs, and 595 abstracts have been archived.

The management of this computer-readable abstract data base requires a software system which is capable of maintaining the data base with a minimum of human effort and which can be used in conjunction with the COSMIC Library Management and Reporting (CLMR) System. Maintenance, report, and utility programs have been developed to manage the computer-readable abstract data base. At the present time, the software developed to support CARS provides the following functions:

a. Accounts for all abstracts written to describe NASA developed software in the COSMIC inventory.

b. Allows convenient access to current information on all recorded COSMIC program abstracts.

c. References the New Technology (NT) number used in the CLMR system to maintain the uniqueness of each abstract.

d. Records the history of the abstract updating process such that both active and archived abstracts are available.

In addition to these functions, support software has been developed to create and maintain an on-line searchable abstract data base. This data base is used by COSMIC staff to retrieve abstracts pertinent to customers needs in a timely fashion. Searching the on-line data base is performed interactively and in real-time.

Another area of development concerning the CARS project is the computerized production of formatted print tapes to be used in generating promotional material. During this contract period, COSMIC produced a complete, comprehensive listing of all published COSMIC program abstracts.

This comprehensive listing, which contains program abstracts, a keyword index, and a subject category index, was made available to the general public in several formats.

MICROFICHE PROJECT

In 1982, the effort to record the entire active COSMIC program documentation library on microfiche was continued. These documents are the original documentation for the program products distributed by COSMIC. Since these documents are all stored in one location, they are vulnerable to destruction by fire or other disaster. It is therefore the primary purpose of the Microfiche Project to provide for the secure and safe storage of the COSMIC program documentation library.

During 1982, the process of recording 96 new technology (NT) items on microfiche was completed. There were 27,122 document pages recorded on 137 microfiche at 48x reduction. One diazo copy was produced for each original microfiche. Since the recording process was performed off-site, COSMIC maintained strict shipment, receipt, and quality control procedures. COSMIC staff continuously maintained quality control by viewing every fiche using microfiche readers located at COSMIC. Each package was considered acceptable only after inspection of both the original and the diazo duplicate. Unacceptable microfiche were returned for further processing. The original microfiche and the diazo duplicate are stored in separate off-site locations as a security measure. A history of the microfiche processing for each NT item is recorded on the COSMIC Library Management and Reporting (CLMR) System.

CUSTOMER INFORMATION SYSTEM PROJECT

The COSMIC Customer Record System was initiated as a special project under contract NASW-2820 in order to more easily respond to the increasing reporting and analyses requirements resulting from expanded COSMIC dissemination services. This system of programs currently has the following capabilities:

a. The capability to differentiate in generated reports between foreign and domestic requestors.

b. The capability to report lease distributions separately from one-time final sale distributions.

c. The ability to maintain billing schedules for leased programs.

d. The capability to maintain customer name and distribution data on devices and in file formats that can be easily accessed using modern file management facilities for special reporting purposes such as generating tailored customer name listings, including address labels, by geographical location, or by particular program or groups of programs purchased or leased.

e. The capability to report sales data by time periods not necessarily identical to established COSMIC reporting periods.

All of the features listed above have been designed and implemented during previous contract periods as part of the Customer Record System. In an effort to further the development of the Customer Record System, the Customer Information System Project was continued during this calendar year. An analysis of the Customer Record System and the proposed Customer Information System was performed and an initial design of an integrated system was developed. This design is being reviewed in terms of present and projected system requirements. Software has been developed to provide interim processing of income data along with limited reporting of invoice and income activity. The development of the Customer Information System will be continued during the next year.

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OPERATING COSTS

OPERATING COSTS

The distribution of costs for the operation of COSMIC for 1982 and the two preceding years is shown in Table XVI. The cost element for subcontracts represents the amount expended on the NASTRAN and STAGSC-1 maintenance subcontracts during the year. The table details the costs and estimates reported as of the end of December, 1982. Not included are costs which were accrued but not reported; also, the overhead item is only an estimate, the final value to be determined at the close of the contract.

While the magnitude of the expenditures cannot be compared for all three years (due to rise in cost of each element), the percentage expenditure on individual cost elements, when based on the total cost minus subcontract cost, can be compared. Overall, this percentage expenditure on each cost element has remained relatively constant throughout the years.

TABLE XVI

OPERATIONAL COSTS

COST ELEMENT	1980 COST	1980* PERCENT	1981 COST	1981* PERCENT	1982 COST	1982* PERCENT
Salaries and Wages	$223,880.69	41%	$245,631.24	41%	$263,102.11	38%
Staff Benefits	44,986.05	8%	51,611.75	9%	59,009.45	9%
Overhead	108,852.81	20%	110,549.12	19%	155,000.00	23%
Computer Costs	55,188.86	10%	63,056.95	11%	53,690.23	8%
Operating Expense	89,912.27	17%	102,989.17	17%	131,728.15	19%
Equipment Purchase	3,718.22	1%	6,464.76	1%	3,759.63	1%
Travel	15,839.29	3%	13,145.34	2%	14,637.65	2%
Subtotals	$542,378.19	100%	$593,448.33	100%	$680,927.22	100%
Subcontracts	211,506.91		268,434.00		318,386.00	
TOTALS	$753,885.10		$861,882.33		$999,313.25	

*Percentage based on total costs minus subcontracts.